

Right Triangles - Trigonometry Basics

- Tools that only work for right triangles (90° angle)

* Pythagorean Theorem

$$a^2 + b^2 = c^2$$

* SOH - CAH - TOA

$$\sin = \frac{O}{H} \quad \cos = \frac{A}{H} \quad \tan = \frac{O}{A}$$



Pythagorean Theorem

Remember that in $a^2 + b^2 = c^2$,

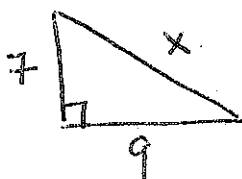
a and b are the sides (a and b are interchangeable)

c is the hypotenuse

↳ longest leg of the triangle

↳ across from the right angle

Example 1:



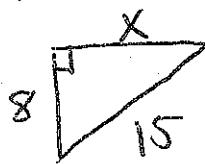
$$7^2 + 9^2 = x^2$$

$$49 + 81 = x^2$$

$$130 = x^2$$

$$x = \sqrt{130} \approx 11.4$$

Example 2:



$$8^2 + x^2 = 15^2$$

$$64 + x^2 = 225$$

$$\begin{array}{r} 64 + x^2 = 225 \\ -64 \quad \quad -64 \\ \hline \end{array}$$

$$x^2 = 161$$

$$x = \sqrt{161} \approx 12.69$$

Did You Hear About . . .

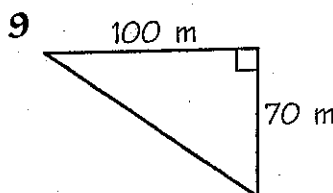
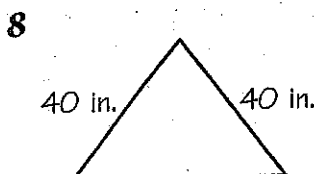
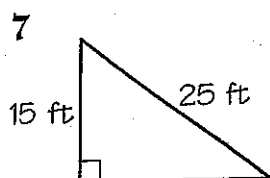
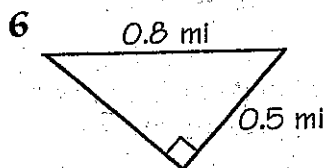
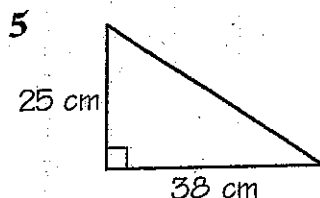
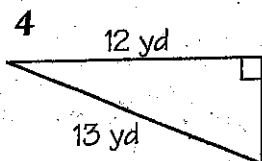
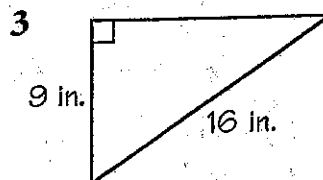
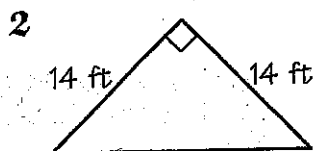
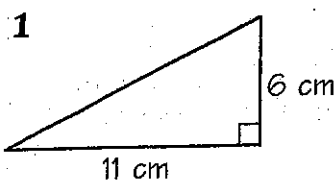
1	2	3	4	5	6	7
8	9	10	11	12	13	14 ?



Write the word next to each correct answer in the box that contains the exercise number (some answers are rounded).

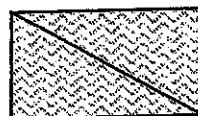


Find the missing side length, if possible.



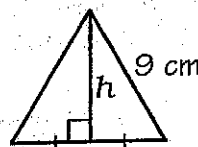
Solve.

- 10 Mr. Smog just bought a big-screen TV set. The screen is 48 in. wide and 27 in. high. Find the length of its diagonal.



- 11 An 18-foot ladder is leaned against a wall. If the base of the ladder is 7 feet from the wall, how high up on the wall does the ladder reach?
- 12 Hulk left home and walked 8 blocks west. Then he turned and walked 6 blocks north. If each block is 500 ft long, how far is Hulk from home?

- 13 Each side of an equilateral triangle measures 9 cm. Find the height, h , of the triangle.



- 14 The lawn in front of Kermit Middle School is in the shape of a rectangle 30 yd long and 16 yd wide. How much shorter is your walk if you walk diagonally across the lawn rather than along two sides of it?

12.9 in. • BOOK

0.6 mi • AROUND

55.1 in. • BY

12 yd • ROUTE

0.7 mi • FROM

6000 ft • BIGGER

5 yd • WHO

12.5 cm • THE

5000 ft • A

44.9 cm • TRIED

20 ft • A

17.2 ft • PUTTING

13.2 in. • STUDENT

122.1 m • BLOCK

56.5 in. • BECAUSE

45.5 cm • WALKED

16.6 ft • TAKING

8.3 cm • NUMBER

19.8 ft • MATH

7 yd • FIGURE

7.8 cm • SQUARE

121.5 m • COUNTING

not possible • CITY

Labeling Sides (to find O, A, H for SOH-CAH-TOA)

H = hypotenuse

- longest leg
- across from right angle

O = opposite

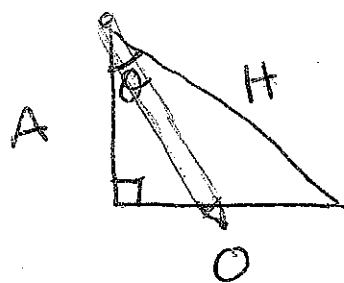
- put your pen through the reference angle
↳ it will point to or cross the "O" side

A = adjacent

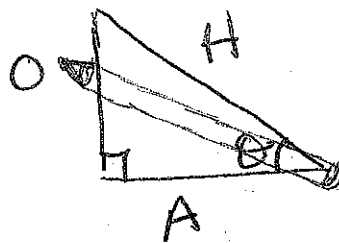
- the side that forms the reference angle along with H
- the only side left after you label O, H

θ = "theta" - it's a greek letter that we use to mark the reference angle or an angle we want to find

Example 1:



Example 2:

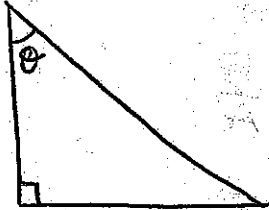


* Note that which side is opposite and which is adjacent changes based on the angle of reference, but H does not change.

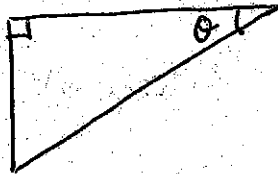
Label each side

O (opposite), A (adjacent) or H (hypotenuse)

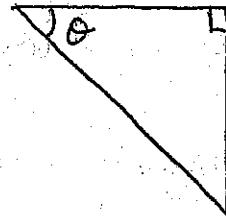
1)



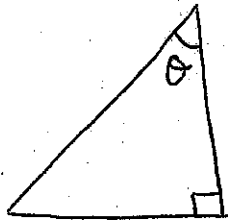
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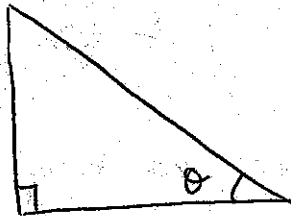
3)



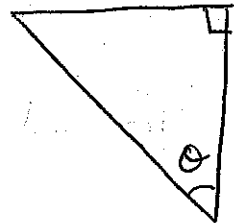
4)



5)



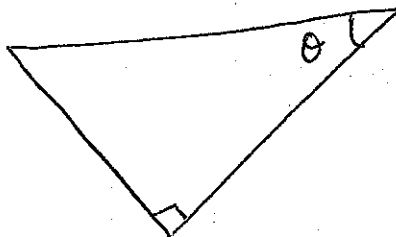
6)



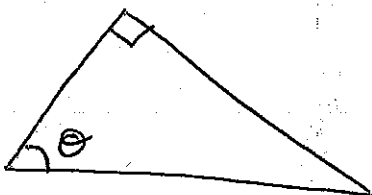
7)



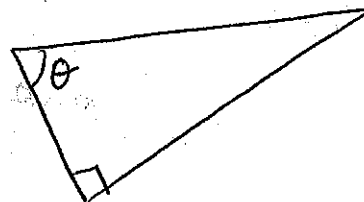
8)



9)



10)



Finding Values of the 6 Trigonometric Functions

SOH - CAH - TOA
function top bottom

Sine $\sin \theta = \frac{O}{H}$

Cosecant $\csc \theta = \frac{H}{O}$

Cosine $\cos \theta = \frac{A}{H}$

Secant $\sec \theta = \frac{H}{A}$

Tangent $\tan \theta = \frac{O}{A}$

Cotangent $\cot \theta = \frac{A}{O}$

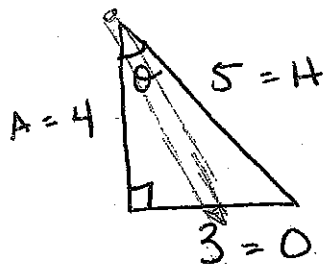
These 3 functions are just the reciprocal of \sin , \cos , and \tan .

To find the value of the trig functions

1: Label the sides O, A, H

2: Use the definition of the functions above

Example: Find the value of the 6 trig functions for the triangle below:



$$\sin \theta = \frac{O}{H} = \frac{3}{5}$$

$$\csc \theta = \frac{5}{3}$$

$$\cos \theta = \frac{A}{H} = \frac{4}{5}$$

$$\sec \theta = \frac{5}{4}$$

$$\tan \theta = \frac{O}{A} = \frac{3}{4}$$

$$\cot \theta = \frac{4}{3}$$

Name _____

Right Triangle Trig. - Evaluating Trig. Ratios

Date _____ Period _____

Find the value of the trig function indicated.

Ex 1) $\sec \theta = \frac{H}{A} = \frac{17}{15}$

